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Original Research Article

Study of maternal near miss as an indicator of quality of obstetrics care in tertiary care centre: a prospective study

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ABSTRACT

Background: Maternal near miss is said to have occurred when women presented with life threatening complication during pregnancy, childbirth and within 42 days after delivery, but survive by chance or good institutional care. For identifying near miss cases five factor scoring system was used. In 2009 WHO working group has standardized the criteria for these cases.
Methods: The study was a descriptive study done for the period of 18 months between 1st June 2021 to 31st December 2022 conducted in the department of Obstetrics and Gynecology at Bundelkhand Medical College Sagar, Madhya Pradesh, India, which is a tertiary care centre. For each cases of near miss, data were collected on demographic characteristics including gestational age at the time of sustaining the near morbidity, nature of obstetric complications, presence of organ dysfunction/failure, ICU admission and timing of near miss event with respect to admission.
Results: A total numbers of 12252 live births were, 28 maternal deaths and 372 MNM cases were reported during the study period. Incidence of MNM was 30.3 %. In present study mortality index is 0.07. Maternal near miss to mortality ratio is 13.2:1. Hypertensive disorder of pregnancy 44.4% were most common cause of MNM followed by severe anemia 23% cases.
Conclusions: Critical analysis of MNM cases will help us in identifying the deficiencies in obstetric care. Maternal mortality and morbidity can be reduced if timely and effective care can be given to women experiencing acute pregnancy related complications .There is need for validation of MNM criteria at peripheral level which will enable them in early identification and timely referral of such cases to tertiary centers.

Keywords: Intensive care unit, maternal near miss, Morbidity, Mortality

INTRODUCTION

Each year in India roughly 28 million women experience pregnancy and 26 million have live births, of these an estimated 67000 maternal deaths occur every year.[1] Maternal mortality is one of the important indicators used for the overall development of a nation. India has committed itself to achieve Sustainable developmental goals (SDGP) over the next 15 years. SDG goal 3A targets to reduce the global maternal mortality ratio (MMR) to less than 70 per 1000000live births by 2030.[2] MMR in India has steadily declined over the years but it is still almost double SDGP. It is estimated that every women who dies 20 or more survive severe maternal complications as a result of the pregnancy or delivery.[3] Investigating these women will increase the understanding of failures in obstetrical care within the health care system. In 2009, WHO introduced the concept of maternal near miss (MNM), for evaluating the quality of care for severe pregnancy complication.[4] A Woman who survives life threatening conditions during pregnancy, abortion and childbirth or within 42 days of pregnancy termination,

irrespective of receiving emergency medical/surgical intervention is called MNM. The WHO near miss approach was published in 2011 to serve as a manual for conducting MNM studies.[5] As MNM cases occur more frequently than maternal death, there has been increasing interest internationally in studying these cases. The maternal death review system has been institutionalized in India. Once we unfold the reason for near miss cases, we can take effective measure to avoid this eventualities. MNM guideline will be useful to the states in identifying the required action needed for improving both maternal and neonatal health. For identifying near miss cases five factor scoring system was used which has specificity of 93.9%. It comprises of organ system failure, ICU admission, transfusion >3 units, extended intubation (>12 hours) and surgical intervention (hysterectomy or laparotomy). These factors are given the scores of 5, 4, 3, 2 and 1 respectively. A five factor scoring system can theoretically have score from 0-15 and cut off point is a score of 8 or greater (Table 1).

Table 1: WHO near miss criteria.

Characteristics	Features
Severe maternal complication	Severe post-partum haemorrhage
	Severe pre-eclampsia
	Eclampsia
	Sepsis or severe systemic infection
	Rupture uterus
	Severe complication of abortion
Critical intervention or intensive care unit use	Admission to intensive care unit
	Interventional radiology
	Laparotomy (includes hysterectomy, excludes caesarean section)
	Use of blood products life threatening condition near miss criteria
Life threatening condition near miss criteria cardiovascular dysfunction	Shock
	Cardiac arrest (absence of pulse/heart beat and loss of consciousness
	Use of continuous vasoactive drugs
	Cardiopulmonary resuscitation
	Severe hypo perfusion(lactate>5mmol/l or>45mg/dl
	Severe acidosis(ph<7.1)
Respiratory dysfunction	Acute cyanosis
	Gasping
	Severe tachypnea (respiratory rate >40 breaths per min)
	Severe bradypnea (respiratory rate <200)
	Intubation and ventilation not related to anaesthesia
	Severe hypoxemia (o2 saturation <90 for >60 min or PAO2/Fio2<200)
Renal dysfunction	Oligurea non responsive to fluids or diuretics
	Dialysis for acute renal failure
	Severe acute azotemia (creatinine >300micromol/ml or >3.5 mg/dl)
Coagulation/haematological dysfunction	Failure to form clots
	Massive transfusion of blood or red cells (>5 units)
	severe acute thrombocytopenia
Hepatic dysfunction	Jaundice in the presence of pre eclampsia
	Severe acute thrombocytopenia (<50000platelets/ml)
Neurological dysfunction	Prolonged unconsciousness (lasting>12 hours)
	Coma (including metabolic coma),strokes, uncontrollable fits, status epilepticus
	Total paralysis
Uterine dysfunction	Uterine haemorrhage or infection leading to hysterectomy

The aim of the study was to recognize these women and review the common pathways leading to severe morbidity. A review of these cases has the potential to highlight the deficiencies, as well as the positive elements in the provision of obstetric services in our health system.

METHODS

The study was a descriptive study done for the period of 18 months between 1st June 2021 to 31st December 2022 conducted in the department of Obstetrics and Gynecology

at Bundelkhand Medical College Sagar, Madhya Pradesh, India, which is a tertiary care centre.

Inclusion criteria

The study was conducted on the patients admitted in labor room including referred, emergency and booked admission. Women with severe complication of pregnancy/labor/puerperium irrespective of gestational age as per WHO near miss criteria were identified and studied. The eligibility was not restricted by the gestational age at which complications occurred i.e. women having abortion or ectopic pregnancy as well as medical conditions and presenting with any of the inclusion criteria were eligible. The first step in implementation the near miss approach was to systematically identify women with severe complications of pregnancy.

Exclusion criteria

Women that developed those conditions unrelated to pregnancy i.e. not during pregnancy or 42 days after the termination of pregnancy were excluded.

RESULTS

A total of 12,252 live births, 28 maternal deaths were reported and 372 women satisfied WHO MNM criteria and were included in the study. Incidence of MNM observed was 30.3% (number of MNM cases divided by total number of live births). Mortality index (MI): Number of maternal death divided by number of women with life threatening condition, expressed as a percentages.

A low index suggests better quality of care. (MI=MD/MNM+MD) 100. In present study MI was 0.07. Maternal near miss to mortality ratio is 13.2:1. We have 13 MNM for 1 maternal death, though it is appreciable with so many overloads of deliveries still we need to improve to achieve national goal and targets.

Majority of MNM cases were between 21-25 years (94.6%). The majorities of cases 67.1% were referred from peripheral health centre. Our medical college caters to all high risk pregnancies from adjoining districts like Teekamgarh, Chhatarpur and Damoh. Most of the patients from rural background (94.7%). The majority of MNM cases 57.8% were multigravida while 42.2% cases were primigravida. The maximum number of pregnant women at a period of gestation 29-40 weeks at the time of complication (Table 2).

Hypertensive disorder of pregnancy (eclampsia and pre-eclampsia 41%) were the most common cause of MNM, followed by anemia without hemorrhage (12.4%). Ectopic pregnancy responsible for 10.6% of near miss cases. Obstetric hemorrhage in 9.8% while incomplete abortion reported in 8.2% cases. Lever disease 6.4%, heart disease responsible for 3.4% cases of near miss.

Table 2: Characteristics of near miss patients.

Characteristics	Number (n-372)	Percentages
Age (in years)		
<20	12	3.4
20-35	352	94.6
>35	8	2
Booking status		
Referred	248	67.1
Unbooked	72	19.8
Booked	52	13.1
Sociodemographic profile		
Rural	352	94.7
Urban	20	5.3
Parity		
Primigravida	156	42.2
Multigravida	216	57.8
Gestational age (weeks)		
<12	60	15.6
13-28	60	15.6
29-40	204	55.2
Postpartum	44	13.8

Table 3: Distribution of maternal near miss according to the complication of pregnancy.

Complication of pregnancy	Number	Percentages
Eclampsia	84	22.4
Severe preeclampsia	70	18.6
Anemia without hemorrhage	46	12.4
Ectopic pregnancy	40	10.6
Obstetric hemorrhage	36	9.8
Incomplete abortion	28	8.2
Lever disease	24	6.4
Heart disease	12	3.4
Obstructed labour	10	2.4
Rupture uterus	8	2.2
Respiratory disease	8	1.9
Sepsis	6	1.7

Table 4 depicts various interventions done in near miss cases in present study, Mgso4 therapy by Pritchard regimen given to 154 (44.4%) patients. Massive blood transfusion given to 134 (23.0%) cases. ICU admission needed by 36 (9.8%) cases, inotropic support (due to shock) in the form of dopamine and nor adrenaline needed by 36 (9.8%) cases. 40 (10.6%) cases underwent laparotomy. (The total of this table does not sum up to (372) as one patient underwent more than one form of treatment).

Distribution of cases according to clinical criteria include maximum cases of loss of unconsciousness for more than 12 hrs i.e. 16 (4.3%) shock 44 (11.8%) clotting failure 56

(15%), respiratory rate <6 min or >40/min in 24 (6.4%), oligurea in 16 (4.3%) and jaundice with severe pre eclampsia in 80 (21.5%) cases. Distribution of near miss cases according to laboratory criteria and O_2 saturation <90% for >60 min in 24 (6.4%) cases. 28 (7.5%) cases with acute thrombocytopenia 28 (7.5%) and serum bilirubin >6 mg/dl 56 (15.5%) and serum creatinine >3.5% in 12 (3.4%) cases.

Table 4: Management clinical and laboratory based identification of near miss cases.

Intervention	Number	Percentages
Mgso4 therapy	154	44.4
Massive blood transfusion	134	23.0
Laparotomy	40	10.6
ICU admission	112	30.2
Higher antibiotic use	48	12.6
Inotropic use	36	9.8
Peripartum hysterectomy	16	4.3
Clinical criteria		
Loss of consciousness>12 hr	16	4.3
shock	44	11.8
Clotting failure	56	15.05
Respiratory rate <6 min or >40 min	24	6.4
Oligurea	16	4.3
Jaundice in presence of pre-eclampsia	80	21.50
Laboratory finding		
O2 saturation <90 % for more than 60 min	24	6.4
Acute thrombocytopenia <50000	28	7.5
S. bilirubin >6mh/dl	56	15.5
S. Creatinine>3.5mg/dl	12	3.4

DISCUSSION

Maternal mortality is a critical indicator to assess the quality of services provided by a birth care system. Globally there has been a decline in MMR. There is a need to further accelerate this decline. This study was done to know the incidence, risk factors and underline causes of MNM in our set up. The incidence of MNM was found to be 30.3% which was similar to 11.6% as obtained by Yelikar et al in tertiary care centre in Maharashtra.[6] The reported incidence varies from 5.1% to 40% in other studies from all over India.[4,7] The mean age of MNM cases was 27.82 years and the majority of cases 94.7% were from rural areas, these observations were comparable to the study conducted by Kaul et al at tertiary care hospital Shimla, the mean age of MNM cases was 26.62 years and majority 79% MNM cases belonged to rural areas.[8] In the present study, 57.8% of patients were multigravida and 42.2% were primigravida, which was comparable to the study conducted by Kaur et al in a tertiary care centre.[9] Majority of cases of MNM were reported in the third trimester (55.2%) similar findings were found in the study done by Bakshi et al and Roopa et al where 52.5% and 57.2% MNM cases respectively reported in third trimester.[7,10]

Early age at marriage and conception, inappropriate antenatal care during pregnancy and late identification and intervention of high risk pregnancies are important contributors to MNM cases. Hypertensive disorder (41%) was underlying causes of MNM in the majority of women, a similar observation was made in other studies, Taly et al and Manandhar et al reported hemorrhage 60%, 48% and 41.66% as the most common cause of MNM respectively.[6,11-15] Though there is rampant use of drugs like labetolol, magnesium sulphate to control pre eclampsia and eclampsia at peripheral health centre, we still need to work on prediction and prevention of hypertensive disorders in pregnancy. In present study out of 372 women 113 (30.2%) were admitted to ICU and most common indication was hypertensive disorder of pregnancy. 134 (23%) women required >5 units of blood and blood products which were comparable with the study conducted by Kalra et al where 58.9% of MNM cases had a blood transfusion.[16]

Table 5: Management based criteria and intervention performed.

Criteria	Das et al (%)	Rajkumar et al (%)	Present study (%)
Massive blood transfusion	38	31	23
Magnesium sulphate therapy	18	-	44.4
ICU admission	2.8	73.49	30.2
Higher antibiotic use	10	8.48	12.6
Inotropic use	54.7	-	9.8
Peripartum hysterectomy	5.21	3.53	4.3

Table 5 shows the intervention done and management in MNM cases. Study by Das et al reported massive blood transfusion in 38% cases, magnesium sulphate therapy in 18% cases, ICU admission in 2.8% cases, higher antibiotic uses in 10% cases and peripartum hysterectomy in 5.21% cases.[17] In present study massive blood transfusion was in 23% patients, magnesium sulphate therapy in 44.4%, ICU admission in 30.2%, higher antibiotic uses in 12.6%, inotropic use in 9.8%, and peripartum hysterectomy in 4.3% cases. The present study matched with Das et al and

differed in 2 parameters i.e. ICU admissions were 9 times more in present study and inotropes use was one fifth of Das et al, Rajkumari et al reported blood transfusion in 31%, ICU admission in 73.49%, higher antibiotic use in 8.48% and peripartum hysterectomy in 3.53% cases.[18]

Hypertensive disorder of pregnancy was the commonest cause of MNM. Early diagnosis of hypertension by proper antenatal care and timely management with magnesium sulphate must be made universally available to prevent this condition.

In the present study the large magnitude of MNM cases may be attributed to improper management of obstetrics emergencies at referring hospitals, poor referral practices, inefficient transport system, and limited availability of blood products and poor access of health care services. Poor documentation could have interfered with case identification and data collection leading to a clinical bias. Prospective surveillance of severe maternal morbidity will permit epidemiological surveillance and aid in generating interventions to reduce unnecessary maternal deaths.

CONCLUSION

India has made significant progress in reducing its maternal mortality rate and a lot more needs to be done. Through the present study, we have tried to understand the causes responsible for maternal morbidity. A study of MNM and its associated factors has helped us to identify what important steps were not taken correctly before referral which has impacted survival high risk cases. As the main cause of MNM in the present study were hypertensive disorders of pregnancy of pregnancy. So management protocol should be strictly followed for hypertensive disorder, obstetric units should practice drills on the management of life threatening conditions regularly so that prompt action can be taken in time of need. The need for identifying the patient conditions and deciding for the referral on time and to the right centre is a critical step towards saving a maternal death. The core of the health system should emphasize on “when to refer” and “where to refer” policy. Studying the near miss in details allows the proper assessment of opportunities that were missed, analyzing the gaps and patient care related factors and help to develop an audit system to maternal care. Managing a near miss case is a team work and prompt and objective intervention can avert a maternal death.

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